DOCUMENT RESUME

ED 397 122 TM 025 260

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TITLE Research Methods Employed in "American Educational Research Journal," "Educational Researcher," and "Review of Educational Research" from 1978 to 1995.
PUB DATE Apr 96
NOTE 21p.; Paper presented at the Annual Meeting of the American Educational Research Association (New York, NY, April 8-12, 1996).
PUB TYPE Information Analyses (070) -- Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Analysis of Covariance; Analysis of Variance; Bayesian Statistics; Content Analysis; Correlation; *Educational Research; Educational Researchers; Meta Analysis; Multivariate Analysis; Nonparametric Statistics; *Psychometrics; *Qualitative Research; Regression (Statistics); *Research Methodology; Research Reports; *Scholarly Journals; Simulation
IDENTIFIERS *American Educational Research Association; American Educational Research Journal; *Descriptive Research; LISREL Computer Program; Review of Educational Research; T Test

ABSTRACT

A content analysis was conducted of three educational research journals published by the American Educational Research Association to review the quantitative and qualitative techniques used in educational research. All articles appearing in these three journals from 1988 through 1995 (total n=1,715) were considered. Research methods were identified and classified into the following categories: (1) descriptive; (2) bivariate correlations; (3) t-test; (4) nonparametric statistics; (5) meta-analysis; (6) analysis of variance (ANOVA) and analysis of covariance (ANCOVA); (7) psychometric theory; (8) multiple correlation and regression; (9) multivariate analysis; (10) factor and cluster analysis; (11) LISREL computer program analysis; (12) Bayesian statistics; (13) simulation; (14) modeling; (15) qualitative methods of several types; and (16) graphic methods. Results are consistent with those of other studies in that the most commonly used methods were ANOVA and ANCOVA, multiple regression, bivariate correlation, descriptive statistics, multivariate analysis, nonparametric statistics, and t-tests. The major difference in current methodology is the increase in the use of qualitative methods. (Contains 5 tables, 4 graphs, and 18 references.) (SLD)

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Research Methods Employed in American Educational Research Journal, Educational Researcher, and Review of Educational Research from 1978 to 1995

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Paper Presented at the Annual Meeting of the
American Educational Research Association
New York

April, 1996

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Research Methods Employed in American Educational Research Journal, Educational Reseacher, and Review of Educational Research from 1978 to 1995

Professors of educational statistics, measurement, evaluation, and research have the task of teaching methodology to each new generation of researchers. In this role they frequently must make difficult decisions about which topics are essential for all educational researchers and should be included in the doctoral tool sequence in statistics and which courses and topics are recommended for specialists in a quantitative doctoral program. Because they are expected to provide students with enough expertise to be intelligent consumers as well as producers of research, the choice of topics to cover in a limited number of courses becomes critical.

One approach to evaluating the extent to which doctoral students are adequately prepared in educational statistics and research methods courses is to conduct a content analysis of educational research journals, and to then compare the methods and techniques used in these research articles to what students are actually learning in graduate school. In this study, the first part of this research will be conducted, namely a content analysis of three educational research journals published by the American Educational Research Association. Such a review of research techniques has appeared frequently in the educational

literature (Dillon,1983; Elmore & Woehlke, 1988; Goodwin and Goodwin,1985a, 1985b; Gordon, Nucci, West, Hoerr, Uguroglu, Vukosavich & Tsai, 1984; Shaver & Norton, 1980; Smith & Caulley, 1981; Walberg, Vukosavich & Tsai,1981; Willson,1980).

It is apparent that periodic updates of the quantitative and qualitative methods used in research literature has a rich history. However, none has been completed since 1987 for the journals published by the American Educational Research Association. It is the intent of this paper to extend our earlier work to the present time by reviewing the quantitative and qualitative techniques used in articles published in American Educational Research Journal (AERJ), Educational Researcher (ER) and Review of Educational Research (RER) for the period 1988 to 1995 and to compare those results with the findings from our review conducted for the period 1978 to 1987 (Elmore & Woehlke, 1988).

Method

All articles appearing in AERJ, ER, and RER for the period from 1988 through 1995 were selected for examination. Book reviews, annual meeting notices, directories, and minutes of meetings were omitted from the review.

The coding process included two steps: (a) reading the article to identify every research method or statistical technique used and (b) categorizing all the methods and techniques

identified in each article. Where more than one method was employed in a single article, all methods were coded into appropriate categories; as a result, the total coded methods may exceed the total number of articles reviewed. The categories employed to code research methods or statistical techniques used in the articles were:

Descriptive: frequencies, percentages, ratios, rates, measures of central tendency and variability;

Bivariate correlation: Pearson product-moment correlation coefficients or other coefficients used with two variables;

t-test: two-group comparison of means;

Nonparametric: statistics used with nominal or ordinal data;

Meta-analysis: syntheses of research using any of three techniques proposed to date by Glass, McGaw and Smith (1981), Rosenthal and Rubin (1982) and Hedges and Olkin (1985);

ANOVA/ANCOVA: hypotheses tested for group differences;

Psychometric theory: application of statistics to the development of measuring instruments;

Multiple correlation/regression: methods used to relate more than one independent variable to a single continuous dependent variable;

Multivariate: techniques using more than one dependent variable;

Factor/cluster: correlational techniques used to isolate subsets of related variables/observations;

LISREL: analysis of covariance structures using maximum likelihood estimation (e.g., path analysis, confirmatory factor analysis;

Bayesian: use of Bayesian statistical methods rather than Neyman-Pearson;

Simulation: analysis of simulated rather than empirical data;

Modeling: empirical test of a theoretical model;

Qualitative: use of specific techniques associated with educational evaluation (e.g., naturalistic observations; field, ethnographic, phenomenological, and case studies)

Graphic methods: use of graphic methods such as bar charts, line graphs, scatter diagrams, histograms, polygons, and box and whisker plots

The first author coded all the ER articles and the second author coded all AERJ and RER articles. The authors used the same coding process and categorization of techniques developed for the 1978 to 1987 study with the addition of one new method, graphic methods. The authors did consult each other

after coding the first year of each journal concerning any problems encountered and they mutually agreed to add the "graphic techniques" category after reviewing their respective journals.

Results

The frequency of research methods or statistical procedures used in AERJ for each of the eight years from 1988 to 1995, the total number of articles reviewed by year, and the total frequency accumulated for each method across the eight years are shown in Table 1. The total for the previous 10 years (1978 to 1987) and the accumulated total for 18 years (1978 to 1995) for each category are reported in the first and last columns, respectively, for comparison. Similarly, the same information for ER, RER, and the three journals combined is contained in Tables 2, 3, and 4, respectively. Table 5 contains the rank order of methods used in AERJ, ER, RER, and the three journals combined for the three time periods (1978 to 1987, 1988 to 1995, and 1978 to 1995). In order for a method to receive a rank, the method had to have a frequency of at least ten.

The six most frequent methods used in AERJ in rank order for the time period 1978 to 1987 were ANOVA/ANCOVA, multiple regression/correlation, multivariate, bivariate correlation, nonparametric, and t-test; for the time period 1988

to 1995 were qualitative, ANOVA/ANCOVA, multivariate, bivariate correlation, multiple regression/correlation, and LISREL and t-test tied; and, for the 18 year time period 1978 to 1995 were ANOVA/ANCOVA, multiple regression/correlation, multivariate, qualitative, bivariate correlation, and nonparametric.

The most frequent methods used in ER in rank order for the time period 1978 to 1987 were descriptive, multiple regression/correlation, and bivariate correlation; for the time period 1988 to 1995 were descriptive and graphic methods; and, for the 18 year time period 1978 to 1995 were descriptive, graphic methods, bivariate correlation, and multiple regression/correlation. Since a technique had to have a frequency of at least 10 to be ranked, fewer than six techniques were ranked for ER.

For RER the most frequent method used across all three time periods was meta-analysis. Since a technique had to have a frequency of at least 10 to be ranked, only one technique was ranked for RER.

The six most frequent methods used in the three journals combined in rank order for the time period 1978 to 1987 were ANOVA/ANCOVA, descriptive, multiple regression/correlation, bivariate correlation, multivariate, and nonparametric; for the time period 1988 to 1995 were descriptive, qualitative, ANOVA/ANCOVA, graphic methods, bivariate correlation, and

meta-analysis; and, for the 18 year time period 1978 to 1995 were descriptive, ANOVA/ANCOVA, multiple regression/correlation, bivariate correlation, multivariate, and qualitative.

Discussion and Conclusions

The results for AERJ and the three journals combined for all three time periods are similar to those reported by Goodwin and Goodwin (1985a) for the Journal of Educational Psychology from 1979 to 1983 in which the most frequent methods used in rank order were ANOVA/ANCOVA, bivariate correlation, t-test, multiple regression, multivariate, and nonparametric techniques. Similarly, our results for AERJ and the three journals combined are consistent with the findings of Goodwin and Goodwin (1985b) for AERJ from 1979 to 1983 in which the most frequent methods reported in rank order were ANOVA/ANCOVA, multiple regression, bivariate correlation, descriptive, multivariate, nonparametric, and t-test. The only major difference is the substantial increase in the use of qualitative methods in AERJ over the last eight years. The frequency for the ten-year period from 1978 to 1987 was four while the frequency for the most recent eight-year time period (1988 to 1995) was 76.

Meta-analysis was the most frequent technique found in RER which is consistent with the journal's editorial policy. The

use of meta-analysis in RER has increased over the time periods studied. The frequency for the ten-year period from 1978 to 1987 was 21 while the frequency for the eight-year period from 1988 to 1995 was 31. A report of a committee of the Mathematical Sciences Board of the National Research Council (1992) stated "quantitative research synthesis--meta-analysis--has gained increasing use in recent years and rightly so. Meta-analysis offers a powerful set of tools for extracting information from a body of related research" (p. 2).

In the review of journal articles it was striking to both authors that many articles contained visual presentation of data including bar charts, line graphs, scatter diagrams, histograms, polygons, and box and whisker plots. Therefore, a new category, graphic methods, was added to the categories already used by Elmore and Woehlke (1988). The importance of exploratory data analysis (Tukey, 1977) and the understanding of graphic methods (Wainer, 1992a, 1992b) for the statistics curriculum (Tukey, 1980) are confirmed in this study in which descriptive and graphic methods were two of the top ranked methods for ER and all journals combined for 1988 to 1995.

In a survey of all PhD programs in psychology (Aiken, West, Sechrest, & Reno, 1990), it was concluded that the statistical and methodological curriculum has advanced little in 20 years and that measurement has experienced a substantial decline. A

similar survey of graduate programs training students in educational statistics has been conducted by Curtis and Harwell (1996). Their results provide information to answer an important question posed for this symposium: How does current pedagogy in educational statistics compare with statistical techniques used in journals published by the American Educational Research Association?

References

Aiken, L. S., West, S. G., Sechrest, L., & Reno, R. R. (1990). Graduate training in statistics, methodology, and measurement in psychology: A survey of Ph.D. programs in North America. American Psychologist, 45(6), 721-734.

Curtis, D. A., & Harwell, M. (1996, April). Training graduate students in educational statistics: A national survey. Paper presented at the meeting of the American Educational Research Association, New York, NY.

Dillon, J. T. (1983). The use of questions in educational research. Educational Researcher, 12(9), 19-24.

Elmore, P. B., & Woehlke, P. L. (1988). Statistical methods employed in American Educational Research Journal, Educational Researcher, and Review of Educational Research from 1978 to 1987. Educational Researcher, 17(9), 19-20

Glass, G. V, McGaw, B., & Smith, L. I. (1981). Meta-analysis in social research. Beverly Hills, CA: Sage.

Goodwin, L. D., & Goodwin, W. L. (1985a). An analysis of statistical techniques used in the Journal of Educational Psychology, 1979-1983. Educational Psychologist, 20(1), 13-21.

Goodwin, L. D., & Goodwin, W. L. (1985b). Statistical techniques in AERJ articles, 1979-1983: The preparation of

graduate students to read educational research literature. Educational Researcher, 14(2), 5-11.

Gordon, N. J., Nucci, L. P., West, G. K., Hoerr, W. A., Uguroglu, M. E., Vukosavich, P., & Tsai, S. (1984). Productivity and citations of educational research: Using educational psychology as the data base. Educational Researcher, 13(7), 14-20.

Hedges, L. V., & Olkin, I. (1985). Statistical methods for meta-analysis. New York: Academic Press.

National Research Council (1992). Combining information: Statistical issues and research opportunities. Washington, DC: National Academy of Sciences Press. [Reprinted as Combining information: Statistical issues and research opportunities. Washington, DC: American Statistical Association, 1993.]

Rosenthal, R., & Rubin, D. B. (1982). Comparing effect sizes of independent studies. Psychological Bulletin, 92, 500-504.

Shaver, J. P., & Norton, R. S. (1980). Randomness and replication in ten years of the American Educational Research Journal. Educational Researcher, 9(1), 9-15.

Tukey, J. W. (1977). Exploratory data analysis. Reading, MA: Addison-Wesley.

Tukey, J. W. (1980). We need both exploratory and confirmatory. The American Statistician, 34(1), 23-25.

Wainer, H. (1992a). Prologue--How the following article came to be. Educational Researcher, 21(1), 12-13.

Wainer, H. (1992b). Understanding graphs and tables. Educational Researcher, 21(1), 14-23.

Walberg, H. J., Vukosavich, P., & Tsai, S. (1981). Scope and structure of the journal literature in educational research. Educational Researcher, 10(8), 11-13.

Willson, V. L., (1980). Research techniques in AERJ articles: 1969 to 1978. Educational Researcher, 9(6), 5-10.

Table 1

Methods Used in American Educational Research Journal

		Year									
Method	78-87	88	89	90	91	92	93	94	95	88-95	78-95
Descriptive	28	1	0	2	2	2	1	2	1	11	39
Bivariate correlation	47	7	1	5	5	2	2	2	5	29	76
t-test	42	4	4	4	3	0	2	3	2	22	64
Nonparametric	46	0	3	0	4	3	2	5	2	19	65
Meta-analysis	13	0	0	0	0	0	0	0	0	0	13
ANOVA/ANCOVA	137	10	7	8	11	8	7	7	6	64	201
Psychometric theory	12	0	0	2	1	0	0	0	0	3	15
Multiple reg./corr.	95	3	3	2	4	3	3	2	8	28	123
Multivariate	53	4	3	4	7	3	3	2	4	30	83
Factor/cluster	30	0	1	2	0	2	3	5	5	18	48
LISREL	38	4	3	4	3	4	0	1	3	22	60
Bayesian	1	0	0	2	0	0	0	0	0	2	3
Simulation	3	0	0	0	0	0	0	0	0	0	3
Modeling	4	0	1	1	0	0	0	1	0	3	7
Qualitative	4	5	8	8	11	16	12	7	9	76	80
Graphic methods	NA	0	0	2	4	0	3	0	0	9	18
Total articles reviewed	400	28	17	35	38	37	31	34	25	245	645

Table 2

Methods Used in Educational Reseacher

	Year									
Method	78-87	88	89	90	91	92	93	94	95	88-95	78-95
Descriptive	84	15	16	11	11	14	8	8	6	89	173
Bivariate correlation	11	1	1	0	2	1	0	1	0	6	17
t-test	2	0	1	0	0	0	0	1	0	2	4
Nonparametric	5	0	0	0	0	0	0	2	0	2	7
Meta-analysis	4	1	1	0	0	0	0	1	0	3	7
ANOVA/ANCOVA	6	0	0	0	0	2	0	0	1	3	9
Psychometric theory	5	0	0	0	0	1	0	0	1	2	7
Multiple reg./corr.	13	1	0	0	0	0	0	1	0	2	15
Multivariate	1	0	0	0	0	0	0	0	0	0	1
Factor/cluster	6	0	0	0	0	0	0	0	0	0	6
LISREL	1	0	0	0	1	0	0	0	0	1	2
Bayesian	0	0	0	0	0	0	0	0	0	0	0
Simulation	0	0	0	0	0	0	0	0	0	0	0
Modeling	0	1	0	0	0	0	0	0	0	1	1
Qualitative	0	0	0	0	0	0	0	0	0	0	0
Graphic methods	NA	5	9	2	2	5	3	2	1	29	29
Total articles reviewed	347	33	35	47	40	45	41	44	43	328	675

Table 3

Methods Used in Review of Educational Research

		Year									
Method	78-87	88	89	90	91	92	93	94	95	88-95	78-95
Descriptive	5	0	0	0	0	0	2	0	0	2	7
Bivariate correlation	2	0	0	0	0	0	0	0	0	0	2
t-test	0	0	0	0	0	0	0	0	0	0	0
Nonparametric	1	0	0	0	0	0	0	0	0	0	1
Meta-analysis	21	6	5	3	2	4	4	2	5	31	52
ANOVA/ANCOVA	0	0	0	0	0	0	0	0	0	0	0
Psychometric theory	2	0	0	0	0	0	0	0	0	0	2
Multiple reg./corr.	0	0	0	0	0	0	1	0	0	1	1
Multivariate	0	0	0	0	0	0	1	0	0	1	1
Factor/cluster	0	0	0	0	0	0	0	0	0	0	0
LISREL	0	0	0	0	0	0	0	0	0	0	0
Bayesian	0	0	0	0	0	0	0	0	0	0	0
Simulation	0	0	0	0	0	0	0	0	0	0	0
Modeling	0	0	0	0	0	0	0	0	0	0	0
Qualitative	2	0	0	0	0	0	0	0	0	0	2
Graphic methods	NA	0	0	0	0	0	1	0	0	1	1
Total articles reviewed	223	19	29	24	21	20	26	16	17	172	395

Table 4

Methods Used in the Three Journals Combined

		Year									
Method	78-87	88	89	90	91	92	93	94	95	88-95	78-95
Descriptive	117	16	16	13	13	16	11	10	7	102	219
Bivariate correlation	60	8	2	5	7	3	2	3	5	35	95
t-test	44	4	5	4	3	0	2	4	2	24	68
Nonparametric	52	0	3	0	4	3	2	7	2	21	73
Meta-analysis	38	7	6	3	2	4	4	3	5	34	72
ANOVA/ANCOVA	143	10	7	8	11	10	7	7	7	67	210
Psychometric theory	19	0	0	2	1	1	0	0	1	5	24
Multiple reg./corr.	108	4	3	2	4	3	4	3	8	31	139
Multivariate	54	4	3	4	7	3	4	2	4	31	85
Factor/cluster	36	0	1	2	0	2	3	5	5	18	54
LISREL	39	4	3	4	4	4	0	1	3	23	62
Bayesian	1	0	0	2	0	0	0	0	0	2	3
Simulation	3	0	0	0	0	0	0	0	0	0	3
Modeling	4	1	1	1	0	0	0	1	0	4	8
Qualitative	6	5	8	8	11	16	12	7	9	76	82
Graphic methods	NA	5	9	4	6	5	7	2	1	39	39
Total articles reviewed	970	80	81	106	99	102	98	94	85	745	1715

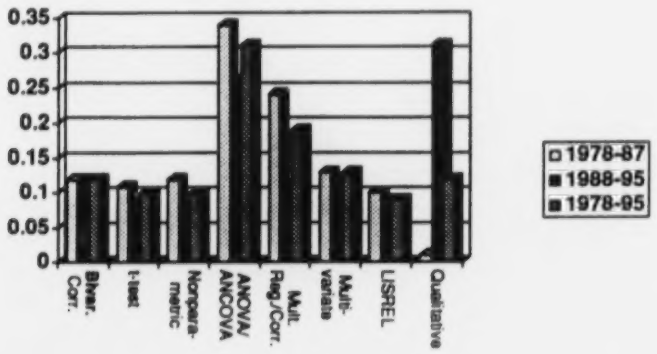
Table 5

Rank Order of Methods Used in American Educational Research Journal, Educational Researcher, Review of Educational Research, and the Three Journals Combined

Method	Journal and Time Period											
	AERJ 78-87	AERJ 88-95	AERJ 78-95	ER 78-87	ER 88-95	ER 78-95	RER 78-87	RER 88-95	RER 78-95	Total 78-87	Total 88-95	Total 78-95
Descriptive				1	1	1				2	1	1
Bivariate correlation	4	4	5	3		3				4	5	4
t-test	6	6.5										
Nonparametric	5		6							6		
Meta-analysis							1	1	1		6	
ANOVA/ANCOVA	1	2	1							1	3	2
Psychometric theory												
Multiple reg./corr.	2	5	2	2		4				3		3
Multivariate	3	3	3							5		5
Factor/cluster												
LISREL		6.5										
Bayesian												
Simulation												
Modeling												
Qualitative		1	4								2	6
Graphic methods	NA			NA	2	2	NA			NA	4	

Note: Only the top six qualitative/quantitative techniques were ranked for each journal for each time period. A technique had to have a frequency of at least 10 to be ranked.

AERJ 1978-87, 1988-95 and 1978-1995



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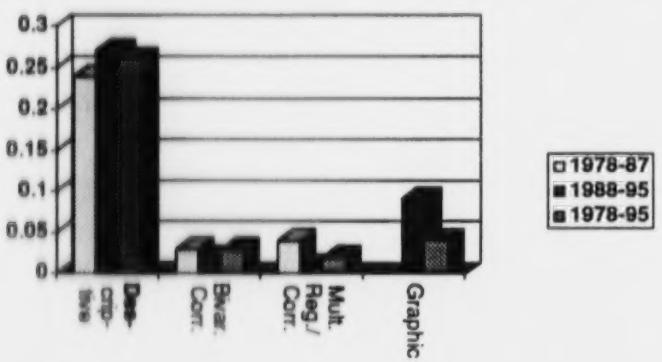
ER 1978-87, 1988-95 and 1978-95



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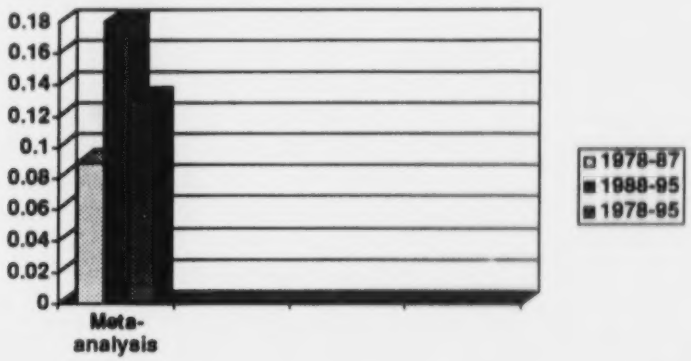

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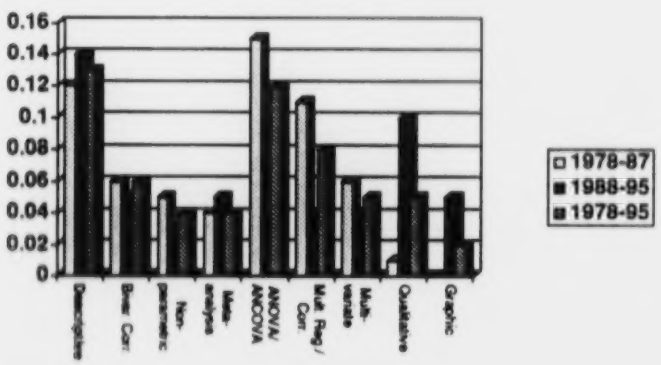
All Journals 1978-87, 1988-95 and 1978-95



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